REMARKS

Claims 1-3, 8-23, and 28-33 remain in the application.

As an initial matter, the Examiner is requested to remove the finality of the rejection. The prior Office Action of April 25, 2002 rejected all the claims as obvious over the combination of Linke, Kramer, and Ponnekanti. The response of July 11, 2002 amended neither of the base Claims 1 and 13 limited the amendments to dependent Claims 17 and 28-33. The present Office Action rejects Claims 1, 3, 8-13, 15, 16, 18-23, 28, 32, and 33 as obvious over the combination of Quartarone and Linke, and the prior substantive rejection is not repeated. Claims 2 and 14 are rejected as obvious over the combination of Quaratarone, Linke, and Kizawa. Accordingly, it is clear that, contrary to the Examiner's statement, Applicant's amendment did not necessitate the new ground of rejection involving Quartarone and Kizawa. Hence, the finality of rejection is improper and all claims may be amended as a matter of right.

The Examiner has rejected Claims 32 and 33 under 35 U.S.C. §112, ¶2 for indefiniteness and lack of antecedent basis. Amendments mostly to the parent Claim 13 should correct the problems.

The Examiner has rejected Claims 1, 3, 8-13, 15, 16, 18-23, 28, 32, and 33 under 35 U.S.C. §103(a) as being obvious over Quartarone (U.S. Patent 5,104,514) in view of J. Linke et al. ("Behavior of boron-doped graphites ... ,' hereafter Linke). Citation to Quartrone cannot be found in the file wrapper of the present application. Applicants have obtained a copy of the Quartrone reference, but notation of its official consideration in the record is requested.

Claim 1 has been amended to require a surface roughness of between 2.5 and 7.6μm, as supported in the filed specification at page 14, line 19. In contrast, as the Examiner notes in his rejection, Quartrone teaches a substantially higher range of between 10.2 and 17.8μm. Quatrone's higher roughness may be due to his emphasis on organic protective layers which do not bond well to inorganic materials such as aluminum.

The dependencies of Claims 2-12 and 28 have been changed to Claim 29, which is

indicated to contain allowable subject matter.

Claim 13 has been amended to a form similar to claims indicated to contain allowable subject matter, that is, coating boron carbide onto both an anodized and a non-anodized portion of the substrate. It too should therefore be allowable. In particular, Quatrone is apparently interested in a double protective layer of anodization and a second coated material. There is no reason to partially remove or only partially form the anodization layer of Quatrone. The claim has been further amended from "anodizing" to –forming an anodization layer–. This language in conjunction with the restriction of the second portion being free of the anodization layer may be broadly interpreted to cover either not anodizing the second portion or removing the anodization from it.

The remaining rejected claims of this group depend from claims now believed to be in allowable form.

The Examiner has rejected Claims 2 and 14 under 35 U.S.C. §103(a) as being obvious over Quartrone in view of Linke and further in view of Kizawa (JP 63-203098). These claim however depend from claims believed to be in allowable form and should therefore also be allowable.

The Examiner has indicated that Claims 17 and 29-31 would be allowable if rewritten to avoid an rejected parent claims. They have been so rewritten.

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Docket: AM-1622.D1

In view of the above amendments and remarks, reconsideration and allowance of all claims are respectfully requested. If the Examiner believes that a telephone interview would be helpful, he is invited to contact the undersigned attorney at the listed telephone number, which is on California time.

Respectfully submitted,

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Version with markings to show changes made

Please replace the claims with:

1. (Already Amended) A method of coating boron carbide on an aluminum-based substrate, comprising the steps of:

roughening a surface of a substrate to a value of surface finish R_a of [at least] between 2.5μm and 7.6 μm, wherein said substrate is composed of an aluminum-based material selected from the group consisting of substantially pure aluminum and aluminum alloys including at least 90 wt% elemental aluminum;

anodizing said substrate to form an anodization layer; and

depositing a boron carbide layer upon said anodization layer.

2. (Twice Amended) The method of Claim [1] 29, wherein said depositing step comprises thermal spraying to form said boron carbide layer upon said surface.

3. (Twice Amended) The method of Claim [1] 29, wherein said depositing step comprises chemical vapor deposition.

8. (Twice Amended) The method of Claim [1] 29, wherein said boron carbide layer comprises B_4C.

9. (Twice Amended) The method of Claim [1] 29, wherein said boron carbide layer comprises particles of B_4C.

10. (Twice Amended) The method of Claim [1] 29, wherein said boron carbide layer comprises a composition between B_4C and $B_{13}C_3$.

11. (Twice Amended) The method of Claim [1] 29, wherein said boron carbide layer comprises between 14 to 30 wt% of carbon relative to a total weight of carbon and boron.

13. (Twice Amended) A method of forming a boron carbide layer on an aluminum-based substrate, comprising:

forming an anodization layer in a first portion of [anodizing] a surface of an aluminum-based substrate [to form an anodization layer], a second portion of said surface being free of said anodization layer; and

then depositing a boron carbide layer upon said first and second portions of said surface including at least a portion of said anodization layer.

16. (Twice Amended) The method of Claim 13, further comprising the step, performed prior to said [anodizing] step of forming said anodization layer, of roughening at least a third [first] portion of said surface of said aluminum-based substrate and wherein said [anodizing] step of forming said anodization layer anodizes said third [first] portion and said depositing step deposits said boron carbide layer on said anodization layer overlying said anodized third [first] portion.

17. (Thrice Amended) [The method of Claim 16, further comprising] A method of forming a boron carbide layer on an aluminum-based substrate, comprising:

an initial step of roughening at least a first portion of a surface of an aluminum-based substrate;

anodizing said surface of said aluminum-based substrate to form an anodization layer, wherein said anodizing step anodizes said first portion;

removing said anodization layer from a second portion of said substrate adjacent to said first portion and separated therefrom by a predetermined boundary, said roughened first portion extending below a portion of said anodization left by said removing step; and

then depositing a boron carbide layer upon said anodization layer, wherein said depositing step deposits said boron carbide layer on said anodization layer overlying said anodized first portion.

28. (Twice Amended) The structure of Claim 29 [1], wherein said roughening step is performed before said anodizing step.

29. (Twice Amended) [The structure of Claim 1, further comprising] A method of coating boron carbide on an aluminum-based substrate, comprising the steps of:

roughening a surface of a substrate to a value of surface finish R_a of at least 2.5μm, wherein said substrate is composed of an aluminum-based material selected from the group consisting of substantially pure aluminum and aluminum alloys including at least 90 wt% elemental aluminum;

anodizing said substrate to form an anodization layer;

removing said anodization layer from only a first portion and not from a second portion of said surface of said substrate; and

depositing a boron carbide layer upon said anodization layer, wherein said boron carbide layer is deposited on both said first and second portions after said removing step.

31. (Amended) [The process of Claim 13, further comprising the step performed between said anodizing and depositing steps of] A method of forming a boron carbide layer on an aluminum-based substrate, comprising:

an initial step of anodizing a surface of an aluminum-based substrate to form an anodization layer;

then removing said anodization layer from a first portion of said substrate separated by a predetermined boundary from a second portion of said substrate from which said anodization layer is not removed; [,] and

then depositing a boron carbide layer upon said anodization layer, wherein said depositing step deposits said boron carbide layer in a layer extending over said first portion of said substrate and across said boundary to a neighboring part of said second portion of said substrate.

32. (Amended) The process of Claim 13, further comprising the step performed prior to said [anodizing] step of forming said anodization layer of roughening a third portion of said substrate including a first part of said first portion of said substrate and extending across a [said] boundary to a [said] neighboring part of said second portion of said substrate.

33. (Amended) The process of Claim 32, wherein a further part of said first portion of said substrate is not roughened and wherein said depositing step deposits said boron carbide layer over said further part and at least a portion of said first part.